

What is claimed is:

1. A network system, comprising a high-order node network including a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes, in which data transferred from each of the low-order nodes is transferred to another low-order node through the high-order node network, wherein

the high-order node network comprises a first high-order node and a second high-order node,

the plurality of low-order nodes comprise a first low-order node as a low-order node of the first high-order node,

the first low-order node comprises:

a detection section detecting a communication failure between the first low-order node and the first high-order node;

a host change request section requesting the second high-order node that the second high-order node serves as a high-order node of the first low-order node in place of the first high-order node when the detection section detects the communication failure; and

a low-order node setting section performing at least one of process for causing the first low-order node to transmit data to the second high-order node in place of the first high-order node on the basis of the process information transmitted from the second high-order node, and

the second high-order node comprises:

a high-order node setting section performing at least

one of process for causing the second high-order node to transmit data received from the first low-order node to another low-order node corresponding to a destination of the data according to the request of the host change request section; and

a process information transmission section transmitting process information corresponding to the process performed by the high-order node setting section to the first low-order node.

2. A network system, comprising a high-order node network including a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes, in which data transferred from each of the low-order nodes is transmitted to another low-order node through the high-order node network, wherein

the high-order node network comprises a first high-order node and a second high-order node,

the plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node,

the first high-order node comprises:

a detection section detecting a communication failure between the first high-order node and the first low-order node;

a host change request section requesting the second high-order node that the second high-order node serves as a high-order node of the first low-order node in place of the first high-order node when the detection section detects the

communication failure,

the second high-order node comprises:

a high-order node setting section performing at least one of process for causing the second high-order node to transmit data received from the first low-order node to another low-order node corresponding to a destination of the data according to the request of the host change request section; and

a process information transmission section transmitting process information corresponding to the process performed by the high-order node setting section to the first low-order node, and

the first low-order node comprises:

a low-order node setting section performing at least one of process for causing the first low-order node to transmit data to the second high-order node in place of the first high-order node on the basis of the process information transmitted from the process information transmission section.

3. A network system, comprising a high-order node network including a plurality of high-order nodes, a plurality of low-order nodes connected to one of the plurality of high-order nodes, and a high-order computer for monitoring at least one of the plurality of high-order nodes, in which each of the low-order nodes transfers data to another low-order node through the high-order node network, wherein

the high-order node network comprises a first high-order node and a second high-order node,

the plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node,

the high-order computer comprises:

a detection section detecting a failure of the first high-order node; and

a host change request section requesting the second high-order node that the second high-order node serves as a high-order node of the first low-order node in place of the first high-order node when the detection section detects the failure,

the second high-order node comprises:

a high-order node setting section performing a process of causing the second high-order node to transmit data received from the first low-order node to another low-order node corresponding to a destination of the data according to the request of the host change request section; and

a process information transmission section transmitting process information corresponding to the process performed by the high-order node setting section to the first low-order node, and

the first low-order node comprises:

a low-order node setting section for performing at least one of process for causing the first low-order node to transmit data to the second high-order node in place of the first high-order node on the basis of the process information transmitted by the process information transmission section.

4. A network system according to the claim 1, wherein each of the high-order nodes holds path information corresponding to a transmission route of data in the high-order node network,

each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transferred to the high-order node, adds path information corresponding to a destination of the data to the data,

each of the high-order nodes transmits the data transferred from a low-order node to another low-order node according to the path information added to the data,

the first low-order node further comprises:

a memory section storing path information added to data when the data is transmitted to the high-order nodes; and

an updating section for receiving updated path information transmitted from the second high-order node to update the memory section on the basis of the updated path information,

the high-order node setting section of the second high-order node generates updated path information as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network according to a request of the host change request section, and

the process information transfer section of the second high-order node transmits the updated path information formed by the high-order node setting section to the first low-order

node.

5. A network system according to the claim 2, wherein each of the high-order nodes holds path information corresponding to a transfer route of data in the high-order node network,

each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data,

each of the high-order nodes transmits the data transmitted from a low-order node to another low-order node according to the path information added to the data,

the high-order node setting section of the second high-order node generates updated path information as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network according to a request of the host change request section,

the process information transmission section of the second high-order node transmits the updated path information generated by the high-order node setting section to the first low-order node,

the first low-order node further comprises a memory section storing path information added to data when the data is transmitted to the high-order nodes, and

the low-order node setting section of the first low-order node receives the updated path information transmitted from

the second high-order node to update the storage section on the basis of the updated path information.

6. A network system according to the claim 2, wherein each of the high-order nodes holds path information corresponding to a transfer route of data in the high-order node network,

each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data,

each of the high-order nodes transmits the data transmitted from a low-order node to another low-order node according to the path information added to the data,

the detection section of the first high-order node detects a failure of the first high-order node itself,

the host change request section of the first high-order node requests the second high-order node that the second high-order node serves as the high-order node of the first low-order node in place of the first high-order node when the failure of the first high-order node itself is detected by the detection section,

the high-order node setting section of the second high-order node generates updated path information serving as new path information corresponding to a transfer route which uses the second high-order node as a source node in the high-order node network and does not comprise the first

high-order node according to a request of the host change request section,

the process information transmission section of the second high-order node transmits the updated path information generated by the high-order node setting section to the first low-order node,

the first low-order node further comprises a memory section for storing path information added to data when the data is transmitted to the high-order nodes, and

the low-order node setting section of the first low-order node receives the updated path information transmitted from the second high-order node to update the storage section on the basis of the updated path information.

7. A network system according to the claim 3, wherein each of the high-order nodes generates path information corresponding to a transfer route of data in the high-order node network,

each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data,

each of the high-order nodes transmits data transmitted from a low-order node to another low-order node according to the path information added to the data,

the high-order node setting section of the second high-order node generates updated path information serving as



new path information corresponding to a transfer route which uses the second high-order node as a source node in the high-order node network and does not comprise the first high-order node according to a request of the host change request section,

the process information transmission section of the second high-order node transmits the updated path information generated by the high-order node setting section to the first low-order node,

the first low-order node further comprises a memory section for storing path information added to data when the data is transmitted to the high-order nodes, and

the low-order node setting section of the first low-order node receives the updated path information transmitted from the second high-order node to update the storage section on the basis of the updated path information.

8. A service recovering method in a network system, comprising a high-order node network constituted by a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes, in which each of the high-order nodes holds path information corresponding to a transfer route of data in the high-order node network, each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data, each of the high-order

nodes transmits the data transmitted from a low-order node to another low-order node according to the path information added to the data, the high-order node network comprises a first high-order node and a second high-order node, and the plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node, wherein

the first low-order node requests the second high-order node that the second high-order node serves as the high-order node of the first low-order node in place of the first high-order node when a failure between the first low-order node and the first high-order node is detected,

the second high-order node recognizes the first low-order node as the low-order node of the second high-order node according to the request of the first low-order node and transmits updated path information serving as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network to the first low-order node, and

the first low-order node receives the updated path information transmitted from the second high-order node and updates the contents of a memory section for storing path information added to data when the data is transmitted to the high-order nodes on the basis of the updated path information.

9. A service recovering method in a network system, comprising a high-order node network constituted by a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes, in which

each of the high-order nodes holds path information corresponding to a transfer route of data in the high-order node network, each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data, each of the high-order nodes transmits the data transmitted from a low-order node to another low-order node according to the path information added to the data, the high-order node network comprises a first high-order node and a second high-order node, and the plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node, wherein

the first high-order node requests the second high-order node that the second high-order node serves as the high-order node of the first low-order node in place of the first high-order node when a communication failure between the first low-order node and the first high-order node is detected,

the second high-order node recognizes the first low-order node as the low-order node of the second high-order node according to the request of the first high-order node and transmits updated path information serving as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network to the first low-order node, and

the first low-order node receives the updated path information transmitted from the second high-order node and

updates the contents of a memory section for storing path information added to data when the data is transmitted to the high-order nodes on the basis of the updated path information.

10. A service recovering method in a network system, comprising a high-order node network constituted by a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes, in which each of the high-order nodes holds path information corresponding to a transfer route of data in the high-order node network, each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data, each of the high-order nodes transmits the data transmitted from a low-order node to another low-order node according to the path information added to the data, the high-order node network comprises a first high-order node and a second high-order node, and the plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node, wherein

the first high-order node requests the second high-order node that the second high-order node serves as the high-order node of the first low-order node in place of the first high-order node when a failure of the first high-order node itself is detected,

the second high-order node recognizes the first low-order node as the low-order node of the second high-order

node according to the request of the first high-order node and transmits updated path information serving as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network and does not comprise the first high-order node to the first low-order node, and

the first low-order node receives the updated path information transmitted from the second high-order node and updates the contents of a memory section for storing path information added to data when the data is transmitted to the high-order nodes on the basis of the updated path information.

11. A service recovering method in a network system, comprising a high-order node network constituted by a plurality of high-order nodes and a plurality of low-order nodes connected to one of the plurality of high-order nodes and a high-order computer for managing the high-order node network, in which each of the high-order nodes generates path information corresponding to a transfer route of data in the high-order node network, each of the low-order nodes receives the path information from a high-order node corresponding to the low-order node itself and, when data is transmitted to the high-order node, adds path information corresponding to a destination of the data to the data, each of the high-order nodes transmits data transmitted from a low-order node to another low-order node according to the path information added to the data, the high-order node network comprises the first high-order node and the second high-order node, and the

plurality of low-order nodes comprise a first low-order node serving as a low-order node of the first high-order node, wherein

the high-order computer requests the second high-order node that the second high-order node serves as the high-order node of the first low-order node in place of the first high-order node when the failure of the first high-order node itself is detected,

the second high-order node recognizes the first low-order node as the low-order node of the second high-order node according to the request of the high-order computer and transmits updated path information serving as new path information corresponding to a transfer route using the second high-order node as a source node in the high-order node network and does not comprise the first high-order node to the first low-order node, and

the first low-order node receives the updated path information transmitted from the second high-order node and updates the contents of a memory section for storing path information added to data when the data is transmitted to the high-order nodes on the basis of the updated path information.